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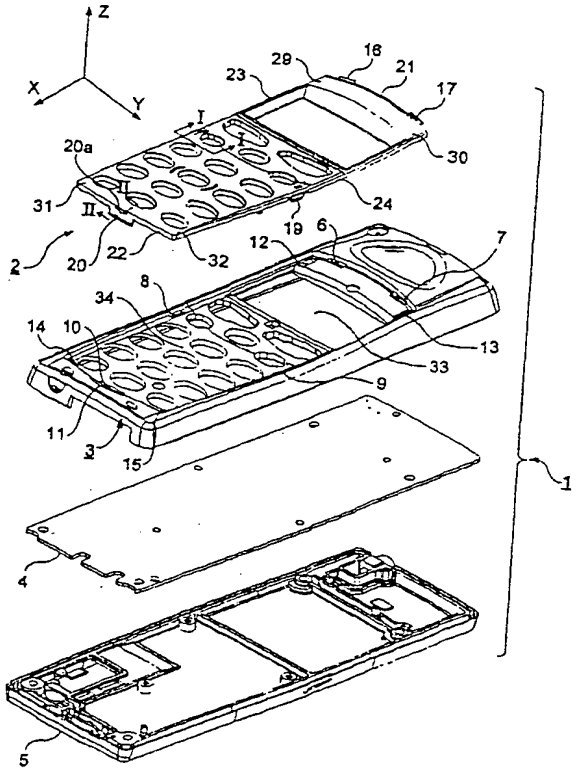
(54) Title: AN EXCHANGEABLE PANEL

(57) Abstract

The invention provides an exchangeable panel (2) of a mobile radio station (1) and a method to manually secure an exchangeable panel (2) to a mobile radio station (1). The exchangeable panel (2) has at least one snap securing means (20) preferably placed at one edge (22) of the exchangeable panel (2). When manually securing the exchangeable panel (2) to the mobile radio station (1), for instance to a front-part (3) of a housing (3, 4) of the mobile radio station (1), the snap securing means (20) of the panel (2) is snapped together with a securing means (10) of the mobile radio station (1) whereby the securing means (10, 20) are mutually secured together. The securing means (10, 20) are hidden when mutually snapped together. Preferably the panel has at one of its edges (21) at least one protrusion (16) which is inserted into a recess (6) of the mobile radio station (1) when the exchangeable panel (2) is secured to the mobile radio station (1).



AN EXCHANGEABLE PANEL

TECHNICAL FIELD OF THE INVENTION

The present invention relates to an exchangeable panel of a mobile radio station and a method to secure an exchangeable panel to a mobile radio station.

DESCRIPTION OF RELATED ART

Some portable radio communication apparatus devices are provided with a panel for aesthetic reasons. The panels can for instance be provided with different patterns and the user of the mobile radio station can choose a panel with a certain pattern in order to personalize the mobile radio station. The panel can be secured for instance on the front or on a flip of the mobile radio station.

A portable radio communication apparatus device, which herein after is referred to as a mobile radio station, includes all portable radio communication apparatus devices such as mobile phones, pagers, communicators, so called electronic organizers, or the like.

It is an advantage if the panel is exchangeable since the user then can exchange the panel in order to personalize the mobile radio station. Mobile radio stations with exchangeable panels are known in the art. However, there are problems with the existing panels. One problem is that it is necessary to use a tool in order to change the panel. Another problem is that the securing means are visible and hence the panel gives a clumsy impression.

SUMMARY OF THE INVENTION

The general problem dealt with by the present invention is to provide an exchangeable panel of a mobile radio station which is easy for the user of the mobile radio station to exchange without using any adhesive or tools, or without having to unnecessarily bend the panel.

A more specific problem dealt with by the present invention is to provide an exchangeable panel of a mobile radio station with securing means, which are not visible, when the panel is secured to the mobile radio station.

The problem is solved essentially by an exchangeable panel which has at least one snap securing means preferably placed at one edge of the exchangeable panel. The exchangeable panel can be manually secured to a mobile radio station, for instance to a front-part of a housing of the mobile radio station. When manually securing the exchangeable panel to the mobile radio station the snap securing means of the panel, preferably a snap-rib, is snapped together with a securing means of the mobile radio station, preferably a hole. The snap-rib is hidden when snapped into the hole, whereby the snap-rib and the hole are mutually secured together. In a preferred embodiment of the present invention the panel has at one of its edges at least one protrusion which is inserted into a recess of the mobile radio station when the panel is secured to the mobile radio station. The snap-rib together with the protrusion keep the panel from falling off the mobile radio station and they create the main securing function. However, the exchangeable panel can also be provided with further securing means such as snap-ribs at the side edges of the exchangeable panel. The exchangeable panel can also be provided with guiding means such as guiding pins which

help the user to secure the exchangeable panel in a correct position when fastening the panel.

The general object of the present invention is to provide an exchangeable panel of a mobile radio station which is easy for the user of the mobile radio station to exchange without using any adhesive or tools.

A more specific object of the present invention is to provide an exchangeable panel of a mobile radio station with securing means, which are not visible, when the panel is secured to the mobile radio station.

The general advantage afforded by the present invention is that an exchangeable panel of a mobile radio station which is easy for the user to exchange without using any adhesive or tools or without having to unnecessarily bend the panel, is provided. It is an advantage for the user to be able to exchange the panel if the user for instance wants to exchange a panel with a certain pattern to another panel with a different pattern.

A more specific advantage afforded by the present invention is that an exchangeable panel of a mobile radio station with securing means which are hidden and hence not visible, when the panel is secured to the mobile radio station, is provided.

A more specific advantage afforded by the present invention is that an exchangeable panel of a mobile radio station with securing means which are small and hence do not require any large space, is provided. For small mobile radio stations it is an advantage if the securing means are small since there is not much space left for any securing means.

A more specific advantage afforded by the present invention is that an exchangeable panel of a mobile radio station with securing means which allows the user to remove the panel from the mobile radio station with a low force and without using any strain. This is afforded by the present invention for an exchangeable panel which shall not move when secured to the mobile radio station.

The invention will now be described more in detail below with reference to the appended drawings which illustrate various aspects of the invention by means of embodiments. The invention is not limited to these embodiments.

It shall be emphasised that `comprises/comprising' when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig 1 illustrates in an exploded, perspective view a mobile radio station with an exchangeable panel according to the present invention;

Fig 2 illustrates in a perspective view from below an exchangeable panel according to the present invention;

Fig 3 illustrates in an enlarged, assembled cross-sectional view taken along line I-I in Fig 1 a securing means used to secure an exchangeable panel to a front-part of a housing of a mobile radio station according to the present invention;

Fig 4 illustrates in an enlarged sectional view taken along line II-II in Fig 1 a securing means used to secure an exchangeable panel to a front-part of a housing of a mobile radio station according to the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

Fig 1 illustrates in an exploded, perspective view a mobile radio station 1.

The parts which the mobile radio station 1 comprise are a panel 2, a front-part 3 of a housing of the mobile radio station 1, a printed circuit board 4, and a rear-part 5 of the housing 3, 5 of the mobile radio station 1. Those parts are arranged to be assembled together. However, the panel 2 is removable, and the user of the mobile radio station 1 is able to manually remove the panel 2 from the mobile radio station 1 and then manually attach it again.

The front-part 3 comprises securing elements which are a first and a second essentially rectangular upper recess 6; 7, a first and a second side securing means 8; 9 and a first securing means 10. The first and the second side securing means are a first side hole 8 and a second side hole 9, respectively. The first securing means is a lower hole 10. The front-part 3 further comprises a lower access-means 11, which is a recess in the front-part 3 and a first, a second, a third and a fourth guiding recess 12; 13; 14; 15. The guiding recesses 12; 13; 14; 15 provide a first guiding system 12, 13, 14, 15 of the mobile radio station 1 which helps the user to secure the panel 2 correctly to the front-part 3.

The panel 2 comprises further securing elements which are a first and a second upper protrusion 16; 17, a first and a second side securing means 18; 19 and a second securing

means 20 (see Fig 2 regarding the first side securing means 18). The first and the second side securing means are a first and a second side snap-rib 18; 19. The second securing means 20 is a lower snap-rib 20 provided with a grip means 20a, which is a groove 20a. The first and the second upper protrusion 16; 17 are both placed at an upper edge 21 of the panel 2, the lower snap-rib 20 is placed essentially at the middle of a lower edge 22 of the panel 2, and the first and the second side snap-rib 18; 19 are both placed at a first side edge 23 and at a second side edge 24, respectively, of the panel 2. The panel 2 further comprises a first, a second, a third, and a fourth guiding means 25; 26; 27; 28 (see Fig 2) placed at a first corner, a second corner, a third corner and a fourth corner 29; 30; 31; 32, respectively, of the panel 2. The guiding means 25; 26; 27; 28 provide a second guiding system 25, 26, 28, 28 of the panel 2 which is arranged to co-operate with the first guiding system 12, 13, 14, 15 of the mobile radio station 1.

The user of the mobile radio station 1 can easily manually secure the panel 2 to the mobile radio station 1 by - in a first step - inserting the first and the second upper protrusion 16; 17, respectively, into the first and the second upper recess 6; 7, respectively, of the front-part 3. In a next step the lower snap-rib 20 is pressed inwards towards the middle of the panel 2 during insertion of the snap-rib 20 into the lower hole 10. In a next step the lower snap-rib 20 is manually snapped into the lower hole 10 in the front-part 3 whereby the lower snap-rib 20 and the lower hole 10 are mutually secured to each other and whereby the panel 2 is secured to the mobile radio station. The snap-rib 20 is hidden when snapped into the hole 10. The lower access-means 11 of the front-part 3 makes it possible for the user to smoothly insert the lower snap-rib 20 into the lower hole 10. Finally, in a last step, the first side snap-rib 18 and the second side

snap-rib 19 are manually snapped into the first side hole 8 and the second side hole 9, respectively, in the front-part 3 whereby the side snap-ribs 18; 19 are mutually secured to the side holes 8; 9. Both the first snap-rib 18 and the second snap-rib 19 are hidden when they are snapped into the first side hole 8 and the second side hole 9, respectively.

The first guiding system of the mobile radio station 1, i.e. the guiding recesses 12; 13; 14; 15, which co-operate with the second guiding system of the panel 2, i.e. the guiding pins 25; 26; 27; 28, helps the user to smoothly secure the panel 2 in a correct position to the front-part 3. The first and the second upper guiding pins 25; 26 are rotation guiding pins which are arranged to be manually inserted into the first and the second guiding recess 12; 13, respectively. The third and the fourth lower guiding pin 27; 28 are rotation guiding pins which are arranged to be manually inserted into the third and the fourth guiding recess 14; 15, respectively. After having inserted the first and the second upper protrusion 16; 17, respectively, into the first and the second upper recess 6; 7, respectively, of the front-part 3 the guiding pins 25; 26; 27; 28 are inserted into the guiding recesses 12; 13; 14; 15 during the insertion of the lower snap-rib 20 into the lower hole 10. The upper rotation guiding pins 25; 26 guide the panel 3 in Z rotation and the lower cartesian guiding pins 27; 28 guide the panel 3 in X and Y directions (see system of coordinates in Fig 1 regarding the directions).

The lower snap-rib 20 together with the upper protrusions 16; 17 keep the panel 2 from falling off the mobile radio station 1 and they create the main securing function. The side snap-ribs 18; 19 secure the panel closely to the front-part 3. Hence, no noise is made when buttons of the

mobile radio station 1 are pressed by the user when the panel 2 is secured to the mobile radio station.

When the panel 2 is secured to the mobile radio station 1, the panel 2 can easily be removed by - in a first step - pressing the lower snap-rib 20 towards the middle of the panel 2, and by in a next step manually lifting the panel 2 away from the front-part 3. It is easy for the user to press the lower snap-rib 20 towards the middle of the panel 2 by inserting a finger in the lower access-means 11 and then lifting the panel 2. The snap-rib 20 is pressed inwards towards the middle of the panel when the panel 2 is lifted. The groove 20a helps the user to grab hold of the snap-rib 20. Hence, when the panel 2 is removed from the front-part 3, in a first step, the lower snap-rib 20 is pressed towards the middle of the panel, then the lower snap-rib 20 is unfastened from the lower hole 10, then the panel 2 is lifted away from the front-part 3 whereby the side-snap ribs 18; 19 are unfastened from the side holes 8; 9 and the upper protrusions 16; 17 are removed from the upper recesses 6; 7.

Since it is easy for the user both to manually secure the panel 2 to the mobile radio station 1 and to manually remove the panel 2 from the mobile radio station 1, it is possible for the user to easily exchange the panel 2 to another panel.

In the embodiment of the present invention shown in Fig 1 the panel 2 is arranged to be secured to the front-part 3 of the housing 3, 5 of the mobile radio station 1. However, in other embodiments of the present invention a panel could be secured to other parts of a mobile radio station, such as for instance to a flip of a mobile radio station. Also, in the embodiment of the present invention shown in Fig 1 the panel 3 covers also a display-area 33 of the mobile radio station 1. However, in other

embodiments of the present invention the panel could cover only a keyboard-area 34 and not the display-area 33 of the mobile radio station 1.

The invention is not limited to the embodiments of the present invention presented in Figs 1-4. For instance, the securing means 18; 19; 20 of the panel 2 can be ball joints wherein the corresponding securing means 8; 9; 10 of the mobile radio station 1 are securing socket joints. The groove 20a could for instance be a protrusion. It is also to be emphasised that that the snap securing means 18; 19; 20 of the panel 2, arranged to be snapped together with the securing means 8; 9; 10 of the mobile radio station 1, can be any securing means which are arranged to be snapped together with other securing means, i.e. for instance a wedge or a spring-loaded pin.

The explosion view of the mobile radio station 1 in Fig 1 is a schematic view; some detailed parts of the mobile radio station 1 such as screws are not shown.

Fig 2 illustrates in a perspective view the rear-side of the exchangeable panel 2 with its several securing elements. Those securings elements are the first and the second upper protrusion 16; 17, the first and the second side snap-rib 18; 19 and the lower snap-rib 20 provided with the groove 20a. The first and the second upper protrusion 16; 17 are placed at the upper edge 21 of the panel 2. The first side snap-rib 18 is placed at the first side edge 23 of the panel 2 and the second side snap-rib 19 is placed at the second side edge 24 of the panel 2. The lower snap-rib 20 is placed at the lower edge 22 of the panel 2.

The panel 2 has also on its rear-side the first, the second, the third and the fourth guiding means 25; 26; 27; 28 which are placed at the first, the second, the third

and the fourth corner 29; 30; 31; 32, respectively, of the panel 2.

Figs 3 and 4 illustrate securing elements used to secure the panel 2 to the front-part 3 of the housing 3, 5 of the mobile radio station 1.

In Fig 3 is illustrated in detail the first side snap-rib 18 of the panel 2 inserted in the first side hole 8 in the front-part 3 and snap-fastened to the front-part 3.

In Fig 4 is illustrated in detail the lower snap-rib 20 of the panel 2 secured to the essentially rectangular lower hole 10 in the front-part 3. The lower access-means 11 of the front-part 3 is also illustrated. The lower access-means 11, which is a recess in the front-part 3, makes it possible for the user to get access to the lower snap-rib 20. The groove 20a of the snap-rib 20 helps the user to grab hold of the panel 2 when the panel shall be removed from the front-part 3.

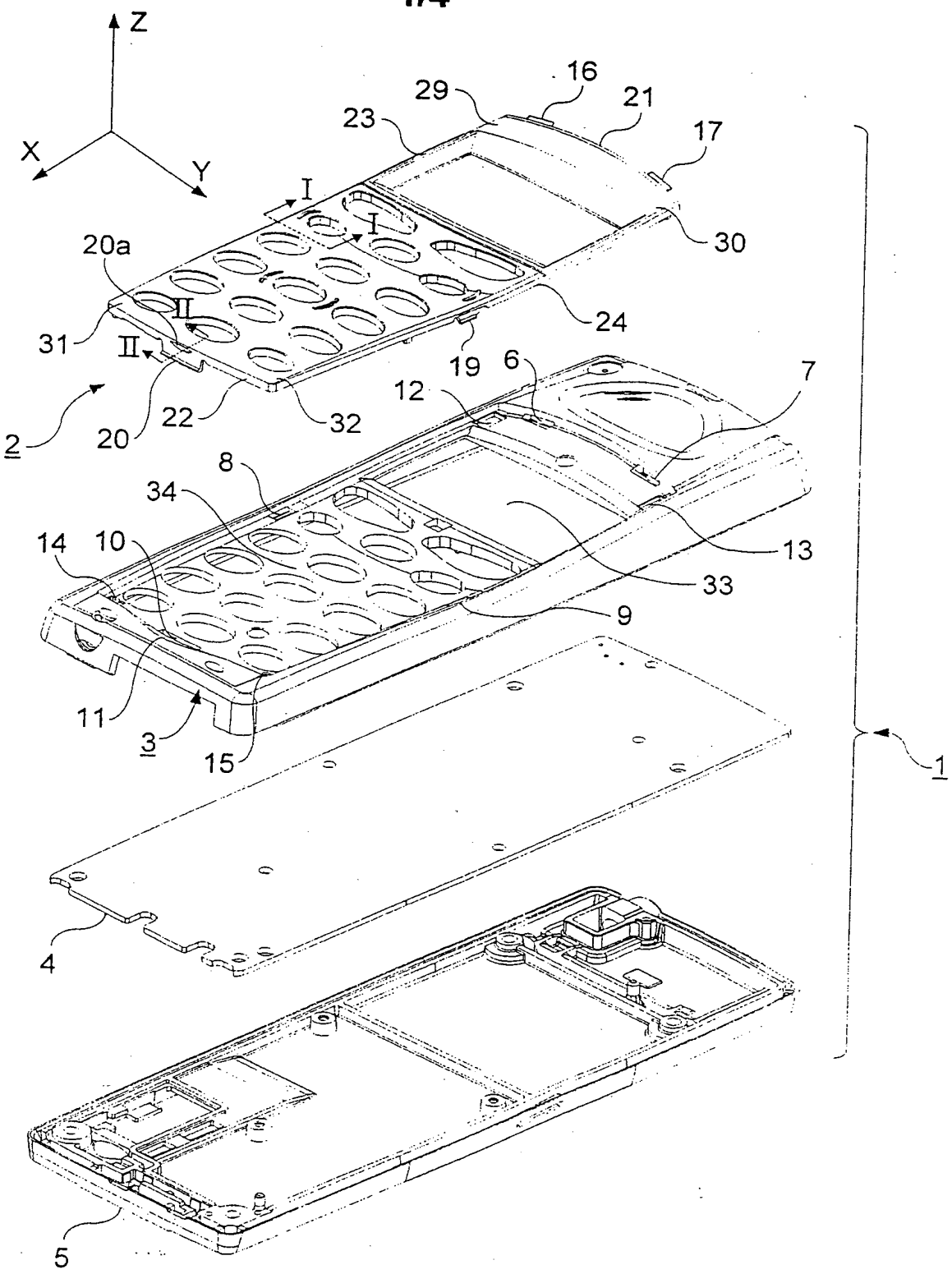

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Fig. 1

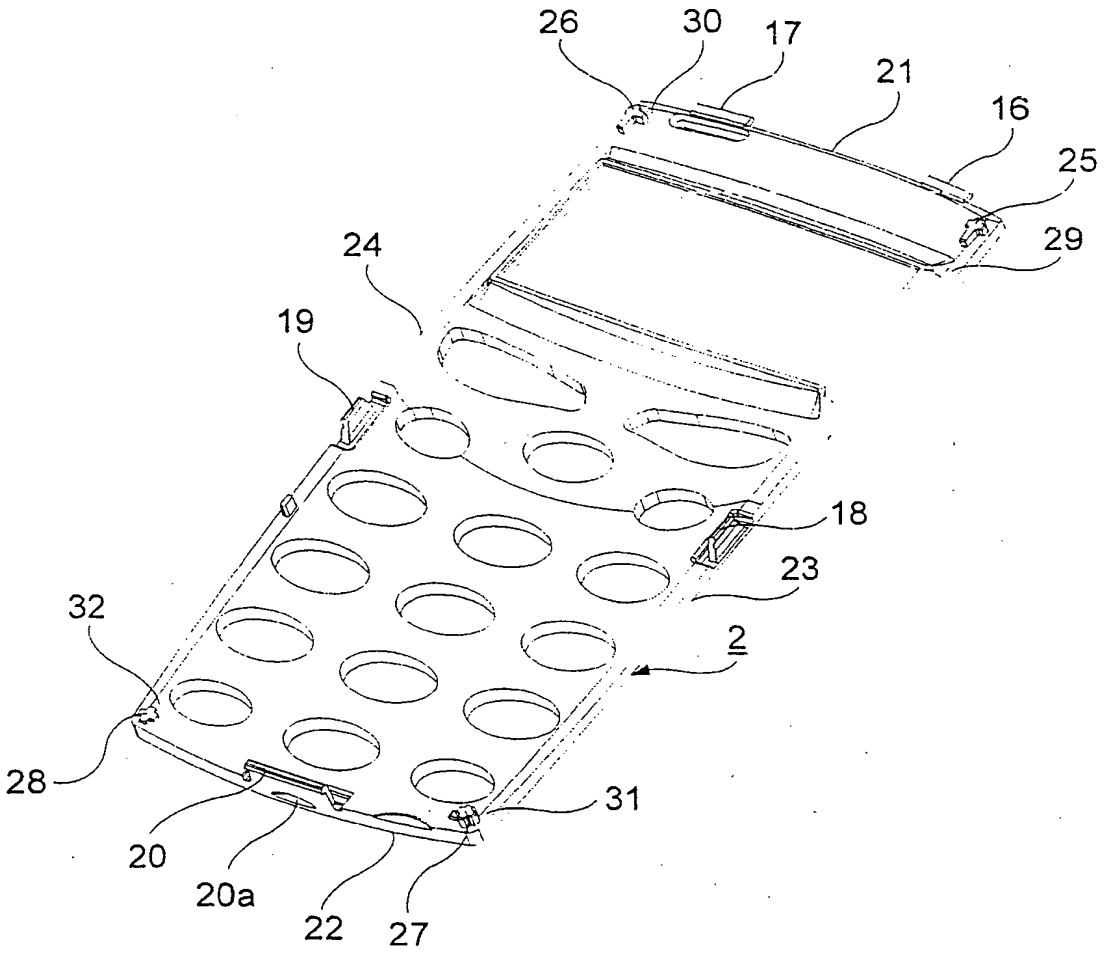

Fig. 2

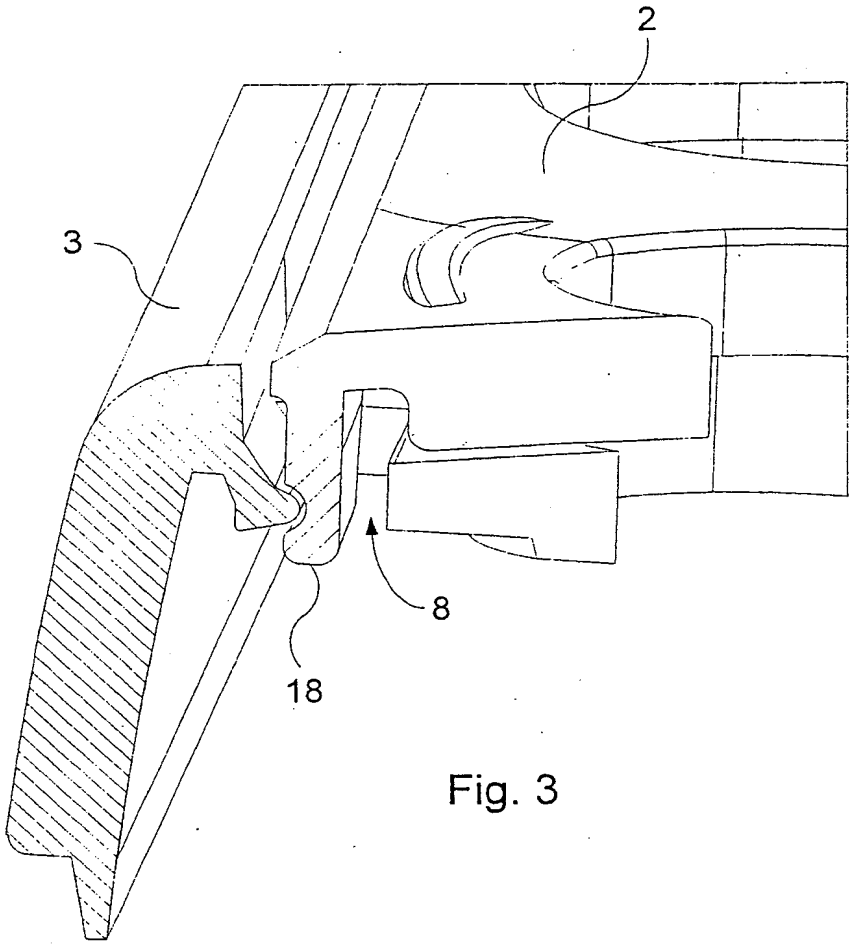

Fig. 3

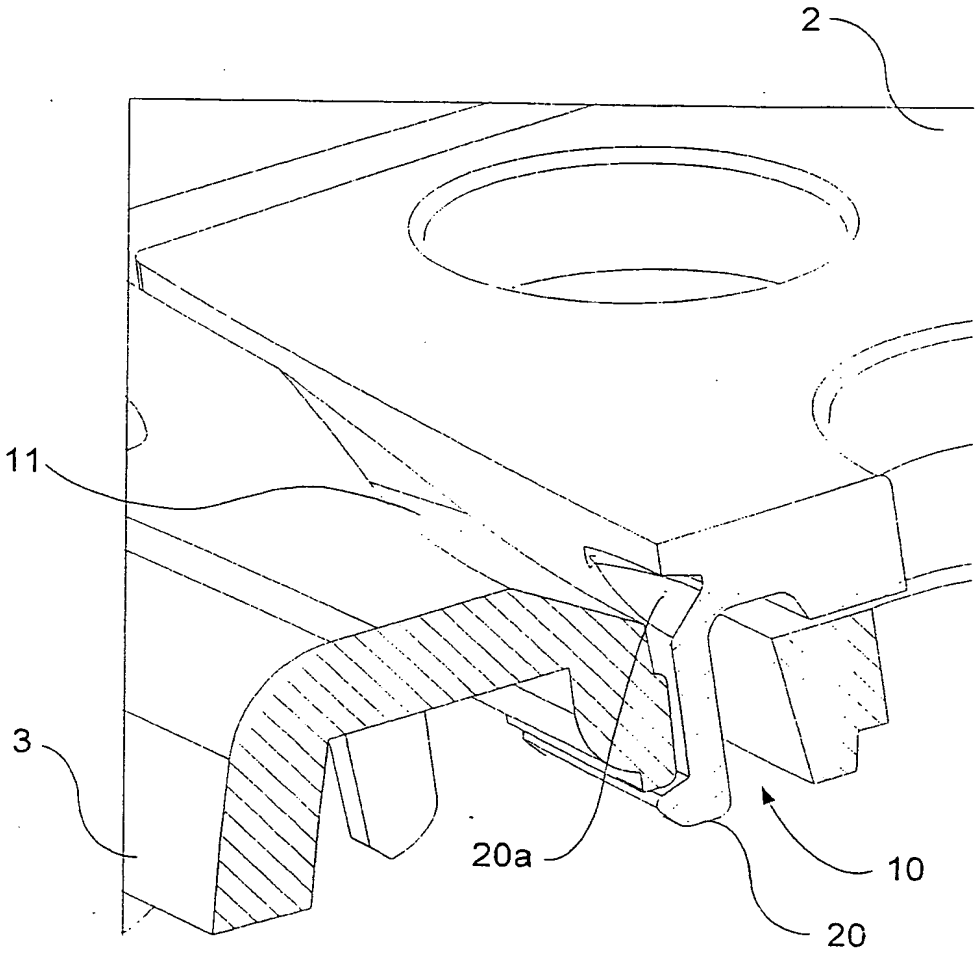

Fig. 4